

REMARKS

Marked-up versions of the amended claims are attached hereto, showing deletions bracketed and additions underlined.

By this amendment claim 20 has been amended and new claim 39 has been added. Claims 20 -22, 27 and 39 remain for reconsideration by the Examiner. Claim 20 is the only independent claim remaining for consideration. This amendment does not introduce any new matter.

The present invention is not obvious from but is patentable over the cited references for the following reasons.

The present inventive semiconductor device defined by claim 20 in the above-amended form has the feature that metal interconnections are directly formed on the bottom surface of the resin member made of a seal resin which seals a semiconductor element therein.

This feature enables omission of a wiring substrate on which metal interconnections are to be formed, thereby facilitating reduction of the thickness of a semiconductor device and also providing a simplified structure of a semiconductor device which can be manufactured at an improved efficiency and reduced cost.

Takeda et al. (USP 5,892,271) discloses a semiconductor device having a semiconductor element mounted on a flexible substrate 4 and metal interconnections formed on the bottom surface of the flexible substrate 4.

Therefore, the present invention is distinguished from Takeda et al. because a semiconductor element is sealed in a resin member (not mounted on a flexible substrate) and because metal interconnections are formed directly on the bottom surface of the resin member made of a seal resin (not a flexible substrate).

Takeda et al. requires a flexible substrate as a wiring substrate and cannot provide the thickness reducing effect of the present invention.

Tomikawa et al. (USP 6,060,771) discloses a semiconductor device having a semiconductor element 1 sealed in an encapsulant or seal resin 8 filling a window of a frame 6 and leads or metal interconnections 4 partially embedded in the encapsulant or seal resin 8 and partially fixed to the bottom surface of the frame 6 via an adhesive 9 intervening therebetween.

Therefore, the present invention is distinguished from Tomikawa et al. because a semiconductor element is sealed in a resin member made of a seal resin with the bottom surface having metal interconnections formed directly thereon.

In Tomikawa et al., the semiconductor element is sealed in the encapsulant or seal resin, which is different from the frame with the bottom surface having metal interconnections fixed thereto. Moreover, the metal interconnections are not directly formed on, but are indirectly fixed to the bottom surface of the frame via the adhesive.

Hotta et al. (USP 6,023,096) only discloses a seal resin containing a filler and does not suggest the features of the present invention.

Therefore, the present invention defined by claim 20 in the amended form is not obvious from, but is patentable over the combined disclosures of the cited references.

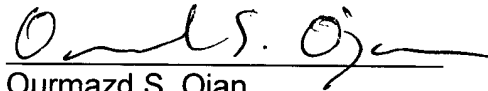
Claims 21, 22, 27 and the new claim 39 are also patentable over the cited references because these claims are dependent directly or indirectly from claim 20 and have all of the features of claim 20, which is patentable over the cited references.

Therefore, the applicant respectfully submits that the present amendment places the application in condition for allowance and a notice to that effect is earnestly solicited.

If in the Examiner's opinion that is not the case, the Applicant asks that the Examiner kindly contact the undersigned by telephone in an effort to resolve any outstanding issues as expeditiously as possible.

Respectfully submitted,

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MARKED-UP VERSIONS OF THE AMENDED CLAIMS

20. (Amended) A semiconductor device provided with:

a resin member of a predetermined thickness, said resin member being made of a seal resin;

a semiconductor element sealed inside said resin member, having a back surface exposed at a top surface of said resin member, and having an active surface facing downward;

metal interconnections formed directly on the bottom surface of the resin member; and

connection terminals extending downward from the active surface of the semiconductor element and having bottom ends connected to top surfaces of said metal interconnections.